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ABSTRACT

This study investigated the effects of course structure variables on the computer anxiety, confidence, and attitudes of college students. Course structure variables include the number of weeks the course met (course length) and the number of meetings per week (course frequency). The effects of differences in instructors' use of anxiety reducing strategies as reported by the students were controlled by statistical analysis. Differences in course structure had significant effects only on students' computer anxiety. Student computer anxiety in courses that met more times per week and for a longer time period was reduced to a greater extent. Computer confidence and attitudes were not differentially affected. (Contains 10 references.) (Author)

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The Effects of Course Structure on Students' Computer Attitudes

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The Effects of Course Structure on Students' Computer Attitudes

This study investigated the effects of course structure variables on the computer anxiety, confidence, and attitudes of college students. These course structure variables included the number of weeks the course met (course length) and number of meetings per week (course frequency). The effects of differences in instructors' use of anxiety reducing strategies as reported by the students were controlled by statistical analyses. Differences in course structure only had significant effects on students' computer anxiety. Students in courses that met more times per week and for a longer time period had their computer anxiety reduced to a greater extent. Computer confidence and attitudes were not differentially affected.

Anxiety toward computers can be a tremendous problem for individuals, especially teachers, in a society that is rapidly becoming more technological. Sanders and Stone (1986) identify societal and occupational consequences of computer deficiencies in our country. These results of computer avoidance have an adverse effect on our society as it becomes more dependent upon computers and other technological innovations. They emphasize the importance of improving computer skills and attitudes for all learners. Raub (1981) surveyed college students regarding their attitudes toward computers and reported that fear or anxiety about computers led to negative attitudes toward their use. Badagliacco (1990) and Howard, Murphy, and Thomas (1987) state that the issue of feelings of anxiety and of alienation toward computers is sufficiently important that intensive study is needed. We should learn more about the nature of computer anxiety so that we might better prescribe effective interventions for learners.

In order to gain a better understanding of the nature of computer anxiety and confidence it is important to investigate their interaction with instruction (Bohlin, 1990). This study was designed to investigate the effects of different course structures on the attitudes of students by investigating student perceptions of the computer instruction and changes in their computer anxiety and confidence scores.

COMPUTER ATTITUDES

Computer anxiety can be viewed as a form of state anxiety associated with computer use (Cambre & Cook, 1985; Howard, 1984). Computer anxiety has been defined as "the fear or apprehension felt by individuals when they used computers, or when they considered the possibility of computer utilization" (Simonson, Mauer, Torardi, and Whitaker, 1987, p. 238).

Studies (Hunt & Bohlin, in press; and Loyd, Loyd, &Gressard, 1987) have found a strong relationship between computer confidence and computer anxiety. This relationship is believed to be based in the cognitive link between expectancy for success with computers and diminished fear of interacting with them. A learner who feels anxious is less likely to be confident of performance.

Conversely, a computer-confident learner is less likely to feel anxiety about using or learning on a computer. Several studies have reported significant correlates to computer anxiety. However none has looked at changes in computer anxiety and confidence as related to specific instructional structure. Loyd &Gressard (1987) have found a relationship between computer confidence and anxiety and usefulness and liking of computers. Because one goal of a computer class in Teacher Education is to facilitate the later integration of computers into the teachers' curriculum, this study also investigated the impact on all four variables.

Because anxiety interferes with encoding and retrieval of learned information, it is expected that increasing the frequency of meetings in a computer class would have a greater impact on the learners' computer confidence, which in turn would have a greater influence on their anxiety. Also, it is expected that increasing the length of a computer class would have a greater impact on the learners' computer anxiety and confidence. This study examined the effects of both.

METHODOLOGY

The study was conducted during the Spring, Summer, and Fall 1991 semesters, using over 15 different sections of a course required for state teaching credentials. The subjects, ranging in age from 20 to 57 years of age (mean = 31.9), were 381 undergraduate, post-baccalaureate, and graduate students at two campuses of a very large western state university. The sample included 71 males, 292 females, and 18 "no response" pre- and in-service teachers. They were given the instruments during their first or second lecture meeting of the term and again during the last week of classes.

The following tests were selected as measures of the variables investigated in this study. Computer anxiety, computer confidence, usefulness of computers, and liking of computers were measured using the appropriate subscales of the Computer Attitude Scale (CAS), developed by Loyd & Gressard. The instrument was validated by judges ratings and an factor analysis of the ratings of 155 subjects, and the subscales of the instrument have a coefficient alpha reliability ranging from 0.76 to 0.89 (Loyd and Gressard, 1984).

Because the teachers' instructional strategies can also have an impact on the affect of the learners, analyses controlled for the rate of use of nine specific anxiety-reducing teacher behaviors. Data for this variable were obtained by subjects' recall. Students were asked to report the frequency (5-level Likert scale) with which their instructor used the nine identified strategies. These anxiety-reducing strategies studied as a variable in this study included the following:

- Showing the insides of a computer or peripheral
- Modeling computer skills
- Encouraging students to learn on the computer by trial & error
- Providing for hands-on computer experiences in class
- Having students work in pairs or small groups
- Providing role models to show that computers are not just a white male domain
- Assuring learners that it is alright to make mistakes on a computer
- Explaining that learners are really in control of the computer

Information regarding the age and sex of the subjects was also obtained. Sections were coded according to the length of the course (greater than or less than 11 weeks) and to the number of sessions per week (once or more than once).

Multiple analysis of variance on repeated measures were performed with the four dependent variables of computer anxiety, computer confidence, usefulness of computers, and liking of computers scores and with the two independent variables of course length (long and short course) and the frequency of meeting (high and low frequency), and the three covariates of instructor behavior (high and low frequency of anxiety reducing behaviors), age (high and low), and sex (male and female).

Subjects were directed to code all of their responses on scanable forms. Their responses were electronically scanned and all analyses were performed using SPSS-PC on an IBM-compatable AT computer.

RESULTS

The Multiple Analyses of Variance found that changes in computer anxiety differed significantly for frequency of meeting ($F_{1,381} = 8.86, p < .005$), for course length ($F_{1,381} = 3.94, p < .05$), and for frequency of meeting X course length ($F_{1,381} = 5.08, p < .05$). Students in high frequency courses (that met more than once per week) and long courses (that met for greater than eight weeks) had a greater reduction in their anxiety towards computers.

The Multiple Analyses of Variance on differences of changes in students' computer confidence, perceptions of usefulness of computers, and liking of computers by course structure were found to be not significant.

DISCUSSION

These results suggest that for these teachers and pre-service teachers the frequency of instructional meetings per week and the period of time over which the instruction occurs can have an important impact on the learners' post-course computer anxiety.

For these subjects, however, frequency of meeting and length of course (within these limits) do not appear to have a significantly different effect on the students' computer confidence, perceptions of computer usefulness, and liking of computers. This is somewhat surprising in several ways.

The mechanism for the effects of high frequency classes lessening the anxiety is typically expected to be through improved confidence. In working with the computers regularly with short time periods between lessons, the students do not have to recall procedures over long time periods such as one week. Because anxiety interfers with memory (both encoding and recall), structures in the course that allow for easier recall or encoding would improve an anxious learner's confidence. Greater confidence and less frustration in forgetting previously learned procedures would be expected to reduce anxiety to a greater extent. These results suggest that the level and rate of frustration during instruction may be a stronger intervening variable for changes in computer anxiety than those investigated. It also might be important to investigate the degree to which instructors assist their students' memory of important skills.

In spite of the lack of significance of length of course on three of the variables, one would expect that instructional interventions over a longer period of time would have a greater effect on attitudes and confidence. Affective shifts seem to require a relatively period of long time to occur. It is possible that changes in computer confidence may be more closely related to total time working with computers and less with these variables. Because of the nature of this course, all sections meet about the same amount of total time. Therefore, total instructional time was not investigated as a variable in this study.

IMPLICATIONS

If a reduction in computer anxiety is an important consideration in the design of a course and/or training for a similar type of student, the instruction should be planned so that it meets frequently during the week and so that the formal learning takes place over a period of more than eleven weeks. These results suggest that the typical summer school course or short-term workshop should not be used when working with in- and pre-service teachers, if they have computer anxiety. These results also suggest that even quarter computer courses, usually ten weeks in length, may not be adequate for learners with relatively high anxiety.

Instructional strategies that reduce computer anxiety do not significantly affect confidence and attitudes toward computers. While there are strong correlations between these variables, they are in fact affected differentially. It, therefore, would seem to be important to continue to investigate at least all four of these variables when studying students and their affective perceptions of computers.

These results also suggest that the degree of frustration during learning may be an important intervening variable to changes in computer anxiety. It is recommended that this variable be included in future studies of interventions of computer anxiety.

It may be necessary to examine the rate of instructors' use of classroom methods of supporting students' memory during instruction, in order to more precisely measure differing effects of course structure. These strategies are different than the anxiety-reducing strategies investigated in this study.

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